

CASE REPORTS

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A New Technique in the Treatment of Renal Bleeding

Epinephrine Infusion in a Patient with Sickle Cell Trait

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DURING THE LAST DECADE there has been an intense interest in pharmacologic agents in angiographic procedures.¹⁻⁹ Epinephrine has been used to enhance tumor visualization in the kidney¹⁻⁴ and gastrointestinal tract.⁵ Vasopressors have been used to control gastrointestinal bleeding through infusions into the splanchnic arteries.^{2,6-8} Renal artery epinephrine infusions have also been used to protect the kidney during radiation therapy.^{3,9} A logical extension of the above work is the use of vasopressor infusion to control severe renal bleeding. Following is a report of a case in which we had opportunity to apply this technique.

Report of a Case

A 27-year-old Negro woman was admitted with severe gross hematuria and mild right flank pain. The patient had been a "sickle cell carrier" with intermittent microscopic hematuria of unknown etiology.

General physical examination was unremarkable except for mild right costovertebral angle tenderness. Admission urine was loaded with red

blood cells and grossly bloody. Hemoglobin was 11 gm and the hematocrit was 33.2 percent. Hemoglobin electrophoresis revealed the hemoglobin to be of the SA type.

An intravenous pyelogram revealed mild caliectasis on the right with no evidence of obstruction. There was no radiographic evidence of papillary necrosis, and it was felt that the findings were compatible with chronic pyelonephritis. Cystoscopy revealed a jet of blood from the right kidney. Cultures from the right ureter revealed 1 plus growth of *E. coli* and cultures from the left kidney were negative.

Following cystoscopy, 5 ml of 10 percent silver nitrate solution were instilled into the right renal pelvis. Bleeding diminished for an hour but then resumed. One unit of whole blood was given. Hematuria continued and the following day the hemoglobin content was 9.8 grams and the hematocrit was 30.1 percent. Another unit of whole blood was given. Bleeding persisted and right nephrectomy was considered, but it was decided first to attempt an epinephrine infusion into the right renal artery in hope of controlling the hematuria.

A catheter was percutaneously passed into the right renal artery, and a selective arteriogram revealed extravasation of contrast medium from an upper pole artery and a "pruned" appearance of the distal vessels in the right upper pole (Figure 1). It was not clear whether these changes were from multiple end artery infarcts or from chronic inflammatory disease. Epinephrine was infused into the right renal artery at the rate of 10 μ g per minute for ten minutes.

Following the procedure there was a pronounced decrease in hematuria, and by the following morning the urine was clear. The patient left the hospital and was seen at weekly intervals with no recurrence of gross hematuria. Although microscopic hematuria has been noted intermittently, the hemoglobin content and the hematocrit have remained stable.

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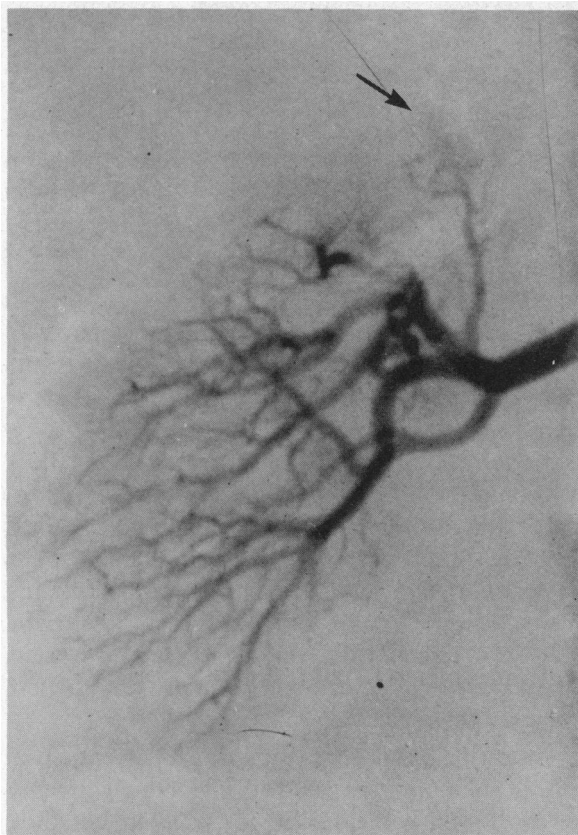


Figure 1.—Selective right renal arteriogram revealing extravasation of contrast from upper pole artery (arrow). Note "pruned" appearance of upper pole vasculature.

Discussion

This was the first known attempt to apply the principle of arterial vasoconstriction to renal bleeding. In this case, extravasation of contrast from the bleeding vessel was identified. In instances where this is possible, a post-infusion arteriogram could graphically demonstrate whether the infusion was successful, but, as Rosche et al have pointed out, the vasodilatory effect of contrast may exacerbate the bleeding and necessitate a repeat infusion.⁸ Monitoring of bleeding is more direct in the urinary tract than in the gastrointestinal tract due to the indwelling catheter.

The dose of epinephrine used was 10 μ g per minute for ten minutes which is slightly greater than that used to protect the kidney during radiation therapy. A mechanical pump such as the Harvard pump is preferred for the infusion. Our

patient experienced a dull ache in the flank during the infusion, a phenomenon that has been reported by Steckel et al with their infusions in preparation for irradiation of the renal bed.⁹

Although the cause of the bleeding in this case was never firmly established, immediate therapy was deemed necessary due to the heavy loss of blood. Obviously, the infusion could not be used to control bleeding from vascular neoplasms or arteriovenous malformations since the vessels would not show normal vasoconstriction when stimulated by epinephrine.

The following categories of renal bleeders may be ideal candidates for infusion:

- Patients with massive hematuria who refuse operation for any reason.
- The renal bleeder who has only one kidney or such severe bilateral disease that nephrectomy could not be tolerated.
- The post-traumatic renal bleeder who has multiple systems traumatized and preferably could have nephrectomy deferred or made unnecessary.

Summary

A patient with sickle cell trait and uncontrolled hematuria with the source localized to one kidney was infused for ten minutes with 10 μ g per minute of an epinephrine solution directly into the involved renal artery. There was prompt cessation of the renal bleeding. This technique appears promising, particularly in selected cases of gross hematuria when operation is contraindicated.

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